

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

OZGUR et al.

Serial No. 10/663,986

Filed: September 17, 2003

For: RADIO FREQUENCY
MICROELECTROMECHANICAL SYSTEMS (MEMS)
DEVICES ON LOW-TEMPERATURE CO-FIRED
CERAMIC (LTCC) SUBSTRATES



Atty. Ref.: 2672-44

Group: 2822

Examiner: Perkins, Pamela E.

June 29, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**COMMENTS ON STATEMENT OF
REASONS FOR ALLOWANCE**

Sir:

In the Statement of Reasons for Allowance included in the Notice of Allowability mailed with the Notice of Allowance in this application on March 29, 2005, the Examiner identified various differences between allowed claims 56, 84, 204, 236 and the claims that depend from such claims in this application and three patents issued to Hinds (U.S. Patent No. 6,225,692), Newton et al. (U.S. Patent No. 6,459,581), and Peterson et al. (U.S. Patent No. 6,538,312). After reviewing these patents and the Statement of Reasons for Allowance by the Examiner, the undersigned inventors of the subject matter claimed in this application point out the following additional differences between the foregoing patents and the claims of the present application discussed by the Examiner:

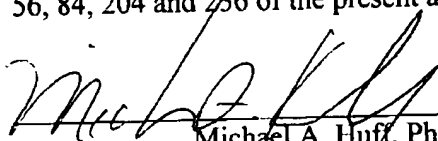
1. U.S. Patent No. 6,225,692 to Hinds discloses a hermetic multilayered ceramic semiconductor package 10 for micromachined semiconductor devices. The package 10 includes a ceramic subassembly 12 formed from three LTCC layers or substrates 30, 22

and 14. The package 10 also includes a micromachined semiconductor device (MEMS) or die 40 having an active micromachined area 42. A solder ring 48 is used to make a hermetic seal between a metal ring 43 attached to semiconductor device 40 and a metal ring attached to ceramic substrate 30. Area 42 is located below a cavity 35 contained in substrate 30. Thus, Hinds does not disclose bonding together first and second LTCC modules, each formed from a plurality of LTCC layers, to form a cavity containing a MEMS device fabricated on an LTCC layer, as recited in independent claims 56, 84, 204 and 236 of the present application.

2. U.S. Patent No. 6,459,581 to Newton et al. issued from Patent Application Publication No. 2002/0075651. Newton et al. disclose an electronic device 20 including a package 21 surrounding an integrated circuit 22 within a cavity 28. The package 21, which includes a base 21a and a lid 21b, may be comprised of LTCC material. Thus, Newton et al. do not disclose first and second LTCC modules, each formed from a plurality of LTCC layers, as recited in independent claims 56, 84, 204 and 236 of the present application. Newton et al. also disclose a series of MEMS pumps 35 located within a pump cavity in the base 21a of device 20. Thus, Newton et al. also do not disclose bonding together first and second LTCC modules, each formed from a plurality of LTCC layers, to form a cavity containing a MEMS device, as recited in independent claims 56, 84, 204 and 236 of the present application.

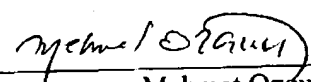
3. U.S. Patent No. 6,538,312 to Peterson et al. discloses an apparatus for packaging microelectronic devices 100, which can include MEMS devices. The package 8 can be formed from LTCC material. It can be an assembly 10 formed from a plate 16'

comprised of six individual layers of glass-ceramic tape 61 – 66 and a plate 30' comprised of six additional individual layers of glass-ceramic tape 67 – 72. Device 100 can be flip-chip mounted to a surface 18 of plate 16'. Thus, Peterson et al. do not teach how to fabricate MEMS devices directly on an LTCC substrate, as recited in independent claims 56, 84, 204 and 236 of the present application.



Michael A. Huff, Ph.D.

Dated 6/29/2005



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Dated 6/29/2005